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BERYLLIUM FACILITY (PROJECT "Be")
BUILDING REGULATIONS

1. DESIGNATED Be AREA (AWE INST. 28/91)

The designated Be area is defined as that area in which the machining, handling, processing and inspection of component parts manufactured from Beryllium is carried out. This area is further sub-divided into specific areas which have been designated thus:-

CONTROLLED AREA Be

OLD MACHINE SHOP
POWDER SHOP
POWDER STORE
INSPECTION

NEW MACHINE SHOP
CASTING SHOP
CLEAN ROOM
BARRIER/CORRIDOR

PRESS SHOP
CIP-HIP
LABORATORY
LAUNDRY

SUPERVISED AREA Be

DESPATCH EXTRACT ROOMS WASTE COMPOUND PUMP ROOM

EXCLUSION AREA Be

PLASMA SPRAY ROTEX/IMPACT

TEMPORARY DESIGNATED AREAS

When work requiring a specified level of control, or an unforeseen event occurs, it maybe necessary to create a temporary designated area applicable to the level of control required.

2. AUTHORISED PERSONNEL

Personnel authorised to undertake work with beryllium in the Controlled Area are restricted to those who have been instructed in Beryllium Safety by the Health Physics Department, and have been cleared for fitness to undertake such work by the Medical Dept.

Visitors entering the Project Be Controlled Area must be escorted at all times and the escort must ensure that, the visitors name is entered in the VISITORS BOOK and that, as escort, he is aware of the purpose of the visit and any restrictions placed on the visitor. (medical, work with Be.)

Non medically cleared personnel are allowed to enter the controlled area for a limited period of time. This period will be at the discretion of the Building Manager who will assess the nature of the work to be undertaken.

3. ENTRY AND EXIT

Entry will only be made through the Barrier Room. Non-regular workers, (excluding visitors), must enter their names on the IN/OUT board located at the barrier.

Exit will normally be made through the Barrier Room except in an emergency, when alternative exits are available. Non-regular workers must ensure that they are "logged" out when leaving the area.

4. PROTECTIVE CLOTHING

Protective clothing must be worn in the Controlled Area. Regular workers require: Vest, Underpants, Shirt, Socks,

Trousers, Coveralls and Shoes.

(Certain tasks may require the wearing of additional protective clothing.)

Non-regular workers and visitors require: Cap, Coverall and Overshoes (2 pairs)

Overshoes must only be WORN ONCE and after use placed in the bins provided, they must not be left on shoes in the shoe boxes. Personnel who do not fully change must wear two pairs of overshoes and remove the TOP PAIR BEFORE taking off coveralls. The under pair of overshoes can then be removed before crossing to the non-controlled side of the barrier.

5. RESPIRATORY PROTECTIVE EQUIPMENT

Where it is anticipated an operation may require the use of a respirator the supervisor of the person who will wear the respirator must complete an assessment in writing taking into consideration :-

- (a) the nature and severity of the hazard
- (b) ergonomic requirements of the work including vision and communication
- (c) precautions against other hazards
- (d) the characteristics and limitations of available equipment
- (e) duration and physical demands of the work.

The issue of respiratory equipment will only be made upon receipt of a written request and a copy of the assessment report. (the present issuing arrangements for full time workers in Project 8e will remain.)

Supervisors are reminded that Respiratory Protective Equipment must NEVER be issued merely to placate the feelings of the person who is to undertake the work, or the level of RPE to be increased, (air suit instead of mask), because of manning arrangements.

Personal air samplers must be switched off and removed before donning a face mask. The only exception is when wearing a half mask to load or onload components from a machine or when carrying out measurement of a component still in the machine.

6. WASHING HANDS

Before leaving the Barrier Room after each entry to the Controlled Area, the hands must be thoroughly washed.

7. INJURIES

Wounds sustained inside the Controlled Area

Any wound, foreign body or other breaks in the skin, however small, that have been received in the Controlled Area, or if not received in the Controlled Area, have not been covered whilst in that area, must be reported to the Medical Department.

Wounds sustained outside the Controlled Area

Minor skin injuries received outside the Controlled Area may be covered with a waterproof dressing before crossing the barrier. All other injuries or medical conditions require the advice of the Doctor or Occupational Health Advisor.

TREATMENT AT THE MEDICAL DEPARTMENT

Four swabs of the wound and wound area will be taken and sent to the Health Physics Laboratory for analysis. If the swabs are assessed as clear of contamination the wound will be dressed and the person returns to work.

If contamination is present after the wound has been swabbed, another set of swabs will be taken and sent for analysis. If after this procedure has been carried out six times clearance from contamination has not been given, the casualty will be referred to Cardiff Royal Infirmary where the wound will receive further treatment.

NB

Personnel must adhere to this basic procedure even if injuries are received near to the end of shift and analysis procedures mean remaining in the factory after the normal end of shift.

Dental Treatment

All persons working within the beryllium area who are returning to work following dental extraction must report to the Medical Department before crossing the barrier. These cases will be referred to the Factory Medical Officer wherever necessary.

8. PERSONAL MONITORING

Personnel will be issued with a Personal Air Sampler(PAS) which consists of a filter holder connected to a pump via a plastic tube. Pumps are allocated on an individual basis, and should a pump require repair a spare pump will be made available by Health Physics until the repair is completed. When entering the controlled area the sampler pump is turned on and clipped to the waist belt provided. The filter head is clipped to the loop positioned high on the left breast of the coverall. On every occasion that the pump is turned on, the indicator light must be inspected to ensure an adequate charge.

When leaving the Controlled Area (except under emergency conditions) the PAS must be returned to the barrier and placed back in the charging rack.

9. PROTECTION AGAINST CONTAMINATION

Beryllium and beryllium contaminated items must not be handled with bare hands. Cut resistant gloves are supplied and are to be worn to prevent contamination, and reduce the risk of receiving injuries to the hands. When operating moving machinery the gloves are to be removed immediately after loading is complete.

Personal articles such as watches, rings and earrings must not be taken into the controlled area. Spectacles if used must be cleaned by washing when leaving the controlled area.

10. PROTECTION AGAINST INGESTION

To minimise the risk of ingestion, smoking, eating and drinking are not allowed in the Controlled Area.

A drinking fountain is available on the controlled side of the barrier for use as required.

11. VENTILATION

The Controlled Area is kept at a negative pressure to ambient by the use of Plenum and Extract systems. These systems will normally be in continual operation.

Failure of ventilation system

If the ventilation system fails, the failure can be complete or partial. In either case a TANNY message will be given and personnel are to assemble at the barrier and await further instructions.

If the ventilation plant fails for a period of 10 minutes or less, normal working will resume as soon as the plant is running normally again.

For periods longer than 10 minutes, re-entry to the controlled area will not be made until the following sampling procedure has been carried out.

(5)

Fifteen minutes after the plant has been running normally air samples will be taken in the following areas:

Old Machine Shop
Powder Room
Inspection Area
New Machine Shop
HIP/CIP Preparation Room

Air sampling will not be required if, during maintenance or a holiday period, the plant is shut down and then switched on at least 10 hours before normal work is due to commence in the controlled area.

12. CLEANING OF MACHINES AND CONTROLLED AREA

12.1 MACHINES, MACHINE ENCLOSURES, CUPBOARDS AND WORK BENCHES

- (a) Dry vacuum clean all areas using small nozzles for inaccessible places.
- (b) Spray all surfaces using approved fluid dispensers working from the higher levels in a downward direction then wiping the surfaces with absorbent blue paper.
- (c) This spray and wipe procedure should be repeated until the absorbent blue paper displays no visible signs of contamination. Waste paper to be disposed of immediately after use.

12.2 Floors

Floors will only be cleaned wherever possible using mechanised floor scrubbing machines. For inaccessible areas the following methods will be used:

- (a) Dry vacuum clean using Nilfisk or similar appliance.
- (b) Wet wash floor using wet mops, changing fluid at regular intervals.

12.3 WALLS AND PARTITIONING

HIGH LEVELS

- (a) Dry vacuum clean using approved tools on NILFISK appliances working downwards.
- (b) Wet wash using CIMEX wall cleaning appliances with suitable extension tools and fluids working downward.
- (c) Inaccessible high level areas will be cleaned using spray and wipe techniques. Where staging or ladders are required operatives must ensure they are adequately supported and if necessary seek assistance.

LOW LEVELS

Clean using the spray and wipe technique.

- 12.4 Where areas or doubts with particular reference to electrical equipment exist and are not covered by this procedure, operatives should first consult his supervisor before commencing work.

- 12.5 Where cleaning of areas specified in sections 21.1-12.3 results in the spillage of dirty fluids onto floor and/or surfaces then these areas must be cleaned in accordance with the relevant section of this procedure.
- 12.6 It is important to note that nothing in this procedure will change the frequency of cleaning as dictated by line management, but defines the most efficient means by which contamination levels can be contained within the Beryllium area.

13 WORK PERMIT

No installation, modification or repair to any plant or building within the Designated Be Area can take place unless a suitable written system of work, detailing fully the extent of the work to be done, has been prepared and agreed between the Building Manager, or his deputy, and the Services Dept.

Where such installation, modification or repair is of a complex nature or poses a significant risk to the personnel involved in the work, or to personnel in the area where the work is to be done, the Work Permit procedure must be implemented.

14 EMERGENCIES

There are three categories of emergency:
FIRE BOMB ALERT MATERIAL SPILLAGE

FIRE/BOMB ALERT

When the VESDA fire alarm or EVACUATION alarm is sounded, the following procedure will be implemented:
Personnel will switch off their machines, or otherwise make their area safe.

Personnel should immediately unclip their personal sampler, switch off the sampler and place down carefully near their workplace.

Personnel will use the nearest exit to vacate the building and go immediately to the Project Be Assembly Point. (South Side Effluent Treatment Building). The barrier man will remove the IN/OUT board, and visitors book, to the Assembly Point and give it to the Administration Officer who is carrying out the muster.

Personnel will not collect personal items.

Personnel on reaching the open air, will remove their overalls, placing them in the bins provided. Clean overshoes and gloves will be put on before proceeding to the muster point.

Cars, motorcycles or bicycles, owned by factory personnel or visitors WILL NOT be removed during an emergency unless authorised to do so.

Escorts of visitors who are in the factory when there is an emergency will be responsible for ensuring that the visitor is taken to the assembly point, removing protective clothing as required, and is listed in the roll call.

Personnel will remain at the assembly point until given further instructions by the Incident Control Officer.

If the emergency is :

FIRE

Personnel will remain at this assembly point until they receive new instructions from the Building Manager.

BOMB ALERT

A nominated person will be present at the assembly point and he will instruct personnel to go to the Factory Assembly Point or to any other location as instructed by the Incident Control Officer.

An evacuation will not take place when the Fire Detection System is being tested by the Fire Department. All personnel will be informed prior to the test being undertaken.

MATERIAL SPILLAGE

In the event of an accident resulting in the uncontrolled/accidental release of beryllium material into the workshop environment, the following procedure will be complied with.

- a. In the event of a confirmed spillage involving the risk of contamination, personnel will evacuate the defined area where the spillage has occurred, cross the barrier and proceed to the messroom where they will receive further instructions. Those involved in the incident will have their overalls dampened by spraying water from spray bottles provided at strategic locations throughout the building. This spraying task will be undertaken by suitably protected personnel.
- b. Those who have been working in the affected area, but not directly involved in the incident, shall not go to the barrier through an incident area without wearing a mask. If masks are not readily available, exit will be made via the emergency exits and following the agreed evacuation procedures, ie. removing overalls and putting on clean overshoes and gloves at the exit door.
- c. The area where the spillage occurred will become a masked (full face) area and entrances to adjacent areas closed off.

- d. As soon as possible after the incident, Health Physics personnel will change the filter papers from the personal air samplers worn by those working in the immediate vicinity of the incident and submit them for analysis.
- e. A Health Physics staff member will decide which static air sampler papers in the incident area are to be changed and a new sampling period of 15 minutes duration (E1) started. Selected smear samples in and around the suspected area will also be taken and analysed.
- f. Section staff will arrange for a team, wearing full face masks and paper overalls covering normal overalls, to carry out decontamination of the suspected area and the wet wash the area.
- g. All sample papers from "d + e" above are to be taken IMMEDIATELY to the Health Physics laboratory and assessed for beryllium content. These samples are to be given priority.
- h. After 15 minutes the E1 sample papers will be removed, new filter papers fitted and a new sampling period (E2) started. These E2 papers will then be analysed following the first set of samples.
- i. The procedure at "h" above will be repeated until concentrations detected on the samples are less than 1.0 microgrammes/cubic metre. (OES 2.0 microgrammes/cubic metre).
- j. As soon as decontamination has been completed, smear samples will be taken and analysed to confirm the return to normal conditions.
- k. Re-entry to the affected area under non-masked conditions will be made when the air sample results indicate airborne concentrations below 1.0 microgramme/cubic metre and selected smear samples have been assessed by Health Physics staff and discussed with safety representatives and production staff.

This procedure applies only to circumstances defined in the document when a "spillage" of beryllium material has occurred.

Spillages can fall into three categories as defined below:

(a) CONFIRMED SPILLAGE

Where there is no doubt that beryllium has been accidentally released into the workshop environment, the person discovering the accident should immediately take steps to evacuate the area by initially informing those persons in the immediate vicinity and the informing the barrier attendant by the quickest means possible. Following the receipt of such a message the barrier man will tannoy the evacuation instructions and contact a member of the Health Physics and Management staff.

(9)

(b) SUSPECT SPILLAGE

Where a release of beryllium into the workshop is suspected the person involved should initially seek to contact his supervisor and Health Physics staff for advice/opinion. If a supervisor is not readily available the person should take action to clear the immediate area then inform the supervisor. If after consultation a spillage of beryllium is confirmed, the actions at (a) above will apply.

(c) HIGH VELOCITY FAILURE (not planned shutdown)

Procedures as for a confirmed spillage will apply.

Personnel are reminded that following an incident it may be possible to work normally in defined work areas whilst decontamination takes place. For the purpose of this instruction the following areas are defined;

- 1 OLD MACHINE SHOP
- 2 NEW MACHINE SHOP, including INSPECTION, STORES, CHROMATING, CLEAN ROOM, and PLASMA SPRAY ROOMS.
- 3 CIP/HIP
- 4 PRESS SHOP
- 5 CASTING SHOP
- 6 POWDER SHOP, IMPACT MILL, ROTEX AREA
- 7 LABORATORY
- 8 EXTRACT PLANT ROOMS

Following a confirmed spillage incident in any of the defined areas above all personnel from that area will immediately evacuate that area. Other areas will work normally unless otherwise instructed.

In a defined area where all personnel are fully protected it is not necessary to adopt procedures as stated for a spillage situation. Should a spillage occur in such circumstances, recognised cleaning procedures will be implemented as soon as possible. Gross or major spillages should be immediately reported to a supervisor and the Health Physics section.

15 NON Be ITEMS LEAVING THE CONTROLLED AREA

On occasions it may be necessary to transfer non-beryllium items from the Controlled Area to other areas of the factory for further work to be carried out on them. For such items the following conditions must apply:-

A staff member of the section requesting the transfer, i.e. Production, Inspection, Services, Laboratory etc., must contact an appropriate staff member of the section who is to receive the transferred item. The nature and content of the work to be undertaken must be fully discussed. After such discussions it is necessary that both agree the transfer.

All normal procedures for thorough cleaning and smear testing of the item must be adhered to.

A valid clearance certificate, countersigned by a Health Physics supervisor must accompany the item to the receiver section. The transfer must be effected on a "person to person" basis, not in a way in which the item can be left in an office or on a table etc.

No work other than that originally agreed at (1) above must take place on the item without first contacting both the requesting officer and a Health Physics staff member.

Items taken into the Controlled Area for maintenance or test purposes must be given clearance by Health Physics prior to removal from the area. It is therefore essential that only the minimum practical amount of such equipment should be taken into the Designated Be Area.

16 THE SAFE HANDLING AND MACHINING OF BERYLLIUM

GENERAL

All personnel involved in the processing and/or handling of beryllium material are reminded of the need to exercise extreme care whilst engaged on beryllium work, and follow guidelines as dictated in existing standing orders and safety instructions.

Personnel should not enter the controlled area without having been given suitable initial Safety Instructions.

Personnel should not undertake work using equipment for which they have not been adequately trained.

Eye protection must be worn at all times when undertaking open machining and on tasks where the eyes could be at risk.

Prior to allocation of work supervisors should satisfy themselves that details specified on route cards will permit safe working procedures, and the operator is suitably trained.

If any operative has any doubts or concerns regarding standards of working practices or instructions, including those related to safety, these should be discussed with their respective supervisors.

Personnel must ensure that a high standard of housekeeping is maintained at all times.

Wearing of suitably approved gloves to minimise the risk of cuts is considered a safe practice and was previously specified in a safety notice "wearing of hand protection" dated 6 February 1989.

Any unusual observations relating to plant and/or equipment must be brought to the supervisors attention immediately. No machining, deburring or polishing operations are permitted without exhaust ventilation, either high velocity or a combination of low and high velocity.

On completion of metal removal tasks and prior to movement eg. by progress, operatives must ensure components are whenever practical, free from hazardous sharp edges, clean and free from loose contamination. Deburring of components must not be carried out by using a file on a machine under powered motion. Burrs and sharp edges are only to be removed in a safe manner.

All components must be stored and transported in suitably approved containers.

METHODS OF MACHINING

The grinding of beryllium must be carried out in an enclosed machine with coolant irrespective of metal removal rate.

Other machining operations (eg. turning, milling, jig boring) are performed dry using (a) fully enclosed machines or (b) open machines.

ENCLOSED MACHINES

Such machines are typically used when the amount of metal removed is considered too excessive to be contained by local tool tip high velocity extract.

Whenever access is required to the inside of the enclosure operatives must wear suitable respiratory protection and remove excess visible material arising as appropriate.

No articles/components must be removed from the confines of the enclosure without prior cleaning.

OPEN MACHINING

These machines must only be used typically for finish machining operations where low metal removal rates apply.

Particular attention must be paid to the local high velocity extract efficiency and general cleanliness of the immediate working area eg. machine surfaces.

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